WHAT IS CLAIMED IS:

1. An active noise canceling headset system, comprising:

an earpiece adapted to be held against a user's ear, the earpiece;

a sound generator, disposed within said earpiece, for generating an anti-noise field in response to drive signals applied thereto;

a first sensor, disposed within the anti-noise field, for generating a residual signal indicative of the sum of ambient sounds and anti-noise impinging on the sensor;

a processor, for generating the drive signals to the sound generator in accordance with said residual signal;

means for approximating the ambient sound perceived at the user's ear;

means for enhancing the low frequency response of the earpice;

means for providing a selected desired signal to the user's ear through the sound generator cancellation;

means for selectively varying the transfer function of the system in reponse to predetermined conditions indicative of potential instability; and

means for generating indicia of conditions indicative of reduced power needs of the system and responsively decreasing power consumption of predetermined portions of the system.

2. The system of claim 1, wherein the first sensor is disposed within said anti-noise field radially offset from the noisefield center such that the residual signal generally approximates the sound at the users eardrum.

3. An earpiece adapted to be held proximate a user's ear, the earpiece comprising:

a sound generator, responsive to drive signals applied thereto, for generating anti-noise;

a sensor for generating a residual signal indicative of the sum of ambient sounds and anti-noise at the location of the sensor;

the sensor being disposed off center from said sound generator such that the residual signal generally approximates the sound at the user's eardrum.

4. The earpiece of claim 3, wherein said earpiece includes an exterior shell comprising an forward lip for disposition proximate the users ear, a rear portion, and a transverse portion intermediate said lip and rear portions forming an interior cavity, said sound generator and sensor being disposed within said shell interior cavity; and at least one aperture in said shell communicating with said interior cavity disposed rearwardly of said sound generator to enhance low frequency response of the earpiece.

5. The earpiece of claim 4, wherein at least one said aperature is disposed in said transverse portion of said shell.

6. The earpiece of claim 5, wherein said transverse portion is inset from said forward lip portion.

7. An active noise canceling system, comprising:

a sound generator for generating an anti-noise field in response to drive signals applied thereto;

a first sensor, disposed within the anti-noise field, for generating a residual signal indicative of the sum of ambient sounds and anti-noise impinging on the sensor;

a processor, for generating the drive signals to the sound generator in accordance with said residual signal;

the first sensor cooperating with the processor and the sound generator to form a feed back loop, wherein the processor generates the drive signals according to a transfer function characteristic of the acoustic properties of the feedback loop; and

means for selectively varying the transfer function of the system in reponse to predetermined conditions indicative of potential instability.

8. A system for active cancellation of ambient noise while passing through particular sounds, comprising:

a sound generator for generating an anti-noise field in response to drive signals applied thereto;

a first sensor, disposed within the anti-noise field, for generating a residual signal indicative of the of ambient sounds and anti-noise impinging on the sensor;

a first mixer, responsive to a signal indicative of the particular sounds to be passed through and the residual signal, for generating a combined signal ;

a processor, for generating a first component of the drive signal in accordance with the combined signal; and

a second mixer, responsive to the signal indicative of the particular sounds to be passed through and the first component of the drive signal from the processor, for generating the drive signal to said sound generator.

9. A method for active cancellation of ambient noise while passing through particular sounds, comprising the steps of:

generating an anti-noise field in response to a drive signal applied thereto;

sensing the residual noise resulting from interaction of the anti-noise and ambient noise within the anti-noise field;

generating, in accordance with the sensed residual noise, the particular sounds to be passed through, and an associated transfer function, a first component of drive signals ;

responsive to the signal indicative of the particular sounds to be passed through and the first component of the drive signal, generating the drive signal to said sound generator.

10. A method for cancelling noise perceived by a user comprising the steps of:

generating, in accordance with drive signals, an anti-noise field;

sensing the residual noise resulting from interaction of the anti-noise and ambient noise within the anti-noise field;

generating the drive signals in accordance with said sensed residual noise pursuant to an associated transfer function;

generating indicia of predetermined conditions indicative of potential instability; and

selectively varying the transfer function in accordance with said indicia.

11. The method of claim 10, wherein said generating indicia of predetermined conditions indicative of potential instability step comprises:

sensing variations in the relationship between sounds within a predetermined frequency range outside of said noise field and sounds within said predetermined frequency range within said noise field.

12. The method of claim 10, wherein said generating anti-noise and sensing residual noise steps are effected within an earpiece, and said generating indicia of predetermined conditions indicative of potential instability step comprises the step of:

sensing the pressure against the earpiece.

13. An active noise canceling headset system, comprising:

a sound generator, disposed within said earpiece, for generating an anti-noise field in response to drive signals applied thereto;

a first sound sensor, disposed within the anti-noise field, for generating a residual signal indicative of the sum of ambient sounds and anti-noise impinging on the sensor;

a second sound sensor disposed a predetermined distance from said sound source and outside of said noise field to generate a signal indicative of ambient noise; and

a processor, for generating the drive signals to the sound generator in accordance with said residual signal and said signal indicative of said ambient noise.

14. The system of claim 13, wherein:

the first sound sensor is connected to cooperate with the processor and the sound generator to form a feed back loop; and

the system further includes means, cooperating with the second sound sensor, for attenuating high frequency components of the ambient noise.

15. The system of claim 13, wherein:

the first sensor is connected to cooperate with the processor and the sound generator to form a feed back loop; and

the second sensor is connected to cooperate with the processor and the sound generator to provide feedforward noise cancellation.

16. The system of claim 15, wherein: the processor includes means for varying its transfer function in response to the signal indicative of ambient noise.

17. An active noise cancelling system comprising:

a sound generator, responsive to drive signals applied thereto, for generating an anti-noise field;

a first sound sensor disposed within said anti-noise field to generate a residual signal indicative of the sum of ambient sounds and anti-noise impinging on the sensor;

a second sound sensor disposed a predetermined distance from said sound source and outside of said noise field to generate a signal indicative of ambient noise

a noise cancellation processor, for generating the drive signals to the sound generator;

the first sensor is connected to cooperate with the processor and the sound generator to form a feed back loop; and

the second sensor is connected to cooperate with the processor and the sound generator to provide feedforward noise cancellation.

18. The system of claim 17, including means for attenuating high frequency components of the ambient noise.

19. An active noise cancelling system comprising:

a sound generator, responsive to drive signals applied thereto, for generating an anti-noise field;

a first sound sensor disposed within said anti-noise field to generate a residual signal indicative of the sum of ambient sounds and anti-noise impinging on the sensor;

a noise cancellation processor, for generating the drive signals to the sound generator; and

means for generating indicia of conditions indicative of reduced power needs of the system and responsively varying the transfer function of the system in reponse said indicia.

20. The system of claim 19, wherein the means for generating indicia of predetermined conditions indicative of reduced power needs comprises means for sensing the level of ambient noise.

21. The system of claim 19, further comprising an earpiece and wherein:

the sound source and the first sound sensor are disposed within the earpiece; and

the means for generating indicia of predetermined conditions indicative of reduced power needs comprises means for sensing the pressure against the earpiece.

22. An active noise cancelling system comprising:

a sound generator, responsive to drive signals applied thereto, for generating an anti-noise field;

a first sound sensor disposed within said anti-noise field to generate a residual signal indicative of the sum of ambient sounds and anti-noise impinging on the sensor;

sub a2 a noise cancellation processor, for generating the drive signals to the sound generator; and

means for generating indicia of the level of ambient noise and responsively varying the transfer function of the system in reponse said indicia.

23. A method for conserving power in an active noise cancelling system, the method comprising the steps of:

generating, in accordance with drive signals, an anti-noise field;

sensing the residual noise resulting from interaction of the anti-noise and ambient noise within the anti-noise field;

generating the drive signals in accordance with said sensed residual noise;

generating indicia of the amplitude of ambient noise; and

selectively varying the level of power applied to portions of the system in accordance with said indicia.

24. A method for cancelling noise perceived by a user comprising the steps of:

generating, in accordance with drive signals, an anti-noise field centered at a location proximate to the users ear;

sensing the residual noise resulting from superposition of the anti-noise and ambient noise at a location radially offset from the center of the anti-noise field to simulate noise cancellation conditions at the user's eardrum; and

generating the drive signals in accordance with said sensed residual noise.

25. A method for increasing the stability of an active noise cancelling system comprising a noise cancellation circuit, a sound sensor and sound generator cooperating in a feedback loop, the feedback loop having an associated transfer function, the transfer function with respect to components of ambient noise within a predetermined range of frequencies tending to vary with aproaching instability of the system, the method including the steps of:

generating, in accordance with drive signals, an anti-noise field;

sensing the residual noise resulting from interaction of the anti-noise and ambient noise;

generating the drive signals in accordance with said sensed residual noise;.and

sensing variations in the transfer function of the system with respect to components of ambient noise within said predetermined range of frequencies; and

varying the transfer function of the system in accordace with said sensed variations.

26. The method of claim 25, wherein:

said sensing variations step comprises the steps of:

determining the ratio of the amplitude of components of ambient noise within said predetermined range of frequencies at a location outside of said noise field and components within said predetermined range of frequencies at a location within said noise field; and

said varying the transfer function step comprises the step of reducing the gain of the system in response to the ratio of the signals exceeds a predetermined threshold value.

27. A method for increasing the stability of an active noise cancelling system comprising a noise cancellation circuit, a sound sensor and sound generator cooperating in a feedback loop, the feedback loop having an associated transfer function, the transfer function with respect to components of ambient noise within a predetermined range of frequencies tending to vary with aproaching instability of the system, the method including the steps of:

generating, in accordance with drive signals, an anti-noise field;

sensing the residual noise resulting from interaction of the anti-noise and ambient noise;

generating the drive signals in accordance with said sensed residual noise;

sensing ambient noise outside of the anti-noise field; and

feeding forward at least the high frequency components of the ambient noise to effect feedforward cancellation thereof.

sub a3)

add a4)